Making Headlines in the Lab

Olivia James

"Scientists Fear Atomic Explosion of Buried Waste" was the eye-opening headline that dominated the front page of *The New York Times* on March 5 of this year. Myriad wire services, radio, and TV broadcasts picked up the story about the possibility that a proposed nuclear dump site at Yucca Mountain, Nevada, might explode. On the surface it seemed the safety and health concerns of the public and the environment were being well-served. But the story behind the story raises some thought-provoking questions about how science is communicated.

According to a year-long internal peer review of the explosion thesis by 30 scientists at Los Alamos National Laboratory in New Mexico, the probability that such a high-level waste site would explode is "essentially zero." The review was not made available, however, to the *Times* reporter at the time he was preparing the story.

What's more, in an account about a week later in the journal *Nature,* one of the two particle physicists championing the notion that a series of chain reactions could trigger a nuclear explosion openly admitted that "in the world that we live in, you look for the weakness in your competition and try to exploit it." Both the *Times* and *Nature* stories disclosed that the physicist is also the leading proponent of a rival nuclear waste disposal technology still vying for federal funding.

Bringing a sophisticated scientific debate to the public arena is no easy task. And the challenges are not getting any easier as science continues to evolve. The public is increasingly interested in—and demanding—better and more immediate access to all kinds of health and environmental information. Emerging communication technologies and media, such as the Internet, hotlines, and TV talk shows, are further clouding the issues. But with credibility as the currency and equalizer of science communication, the experts say the issues are surmountable. Time will tell whether the stakeholders are up to the challenge.

Fact and Fallacy

The Yucca Mountain case illustrates the multifaceted problems involved in communicating scientific information to a general audience. In addition to the inherent difficulties in simplifying highly technical information for public consumption, there are a host of external forces shaping how information is communicated, including the varied interests of scientists and journalists, the limitations of the science itself, the dynamics of public perception, and competing political interests.

In today's increasingly complex society with ever-expanding technological capabilities, greater potential than ever exists for the message to get fouled up and frustrate not only the public, but scientists, policy makers, and research institutions. To begin with, few scientists are capable of describing their work in laymen's terms, explains Laurie Garrett, president of the National Association of Science Writers, and those who can often resort to being patronizing, which is a turn-off to the public. "Even journalists who are fluent in the scientific language often have a problem obtaining usable quotes from some scientists," says Garrett, a science writer with *Newsday* in New York.

Finding experts in a given field who can be trusted to give an objective viewpoint ranks as another leading difficulty, according to Richard Stone, the environmental science reporter for *Science*, which is published by the American Association for the Advancement of Science. "It's easy to find people who are going to exaggerate the importance or relevancy of a finding," Stone says. Michael Jacobson, executive director of the Center for Science in the Public Interest (CSIPI), agrees. "Researchers or organizations naturally exaggerate. It's a problem of being human."

Ronald Begley, Washington bureau chief of *Chemical Week*, argues that the problem is more involved than that. There's a tendency for various groups to feed on studies that support their views and dismiss studies that don't, Begley says. "Industry and environmental groups often use science or pseudo-science to argue for things, and they don't necessarily use it correctly," he says.

For these reasons, it's important to accurately portray the position a news source is coming from, including their financial interests, Stone says. "It's unfair to write about results hyped by industry or environmentalists without getting the other side."

Samuel Silverstein, president of the Federation of Applied Science and Experimental Biology, says that a lot of the communication errors are only natural because the various parties, as well as the information, are imperfect. "Even federal agencies have limitations. No one group can opine on everything," he says. Silverstein compares communication of conclusions based on scientific information to a trip to the doctor. "When you go to a doctor, the doctor makes decisions on the basis of imperfect information."

Nelson E. Fabian, executive director of the National Environmental Health Association, says that people who formulate and communicate health and science policies to the public may intentionally as well as inadvertently introduce bias into

the communication process: "Policy makers are human beings. If they calculate positions, there are a host of factors that range from science to the read on the constituency. Science is just one component. The financial issues are there, too, but again they are just one issue of several." In the final analysis, Garrett adds, "very few policy makers give science much weight," though it varies radically by politician.

Anne Thomas, associate director of the National Institutes of Health Office of Communications, says reporters "should look at sources and motives; it's definitely part of their job," especially with so many groups and institutions now offering science information. For example, a single medical advance may be promoted by the journal it's published in, several funding agencies, the university's medical school, and sometimes voluntary organizations affiliated in some way with the findings, Thomas says.

Often, part of the problem is an inherent limitation in the scientific process: scientific results may lend themselves to a variety of interpretations. For parties involved in communicating science, getting across the conditional nature of discovery is a major challenge. "People often think 'this is the truth,' when it really is a hypothesis backed up by data," says Thomas. "Inherent in science is mutability. It changes as science grows."

In trying to meet the expectations of a public that wants hard and true answers, science communicators may risk jumping to conclusions to meet their audience's demands. For example, extrapolating from wildlife to humans or from the test tube to humans entails a broad range of uncertainty. A rash of alarming stories in the mainstream media in the past year about environmental estrogens reducing sperm counts are a prime example of how findings can be misinterpreted. According to Stone, neither the scientists who released the information nor the journalists who reported the story looked closely enough at the doses of estrogens encountered by humans. On closer examination of the data, says Stone, assertions that estrogenlike compounds pose a threat to human reproductive health are, for now, theoretical.

Silverstein maintains, however, that instead of overselling their latest findings to the media, scientists are actually more reluctant to speculate with journalists than with their colleagues. "I know my peers know when I leave the data and start to speculate. Reporters frequently don't."

In the past, both scientists and journalists have overstated claims and released preliminary findings in the race to be first. One example of a race to "get the scoop" occurred in the early AIDS coverage, Garrett observes. "Quite a number of theories were put forward and got a lot of play well before there were any data to back up the claims." Still, says Silverstein, just the focus of attention on an issue may result in a benefit. For example, Silverstein says though Robert Gallo may not have really been the first to isolate the AIDS virus, he still helped the world develop an HIV test faster and safeguard the blood supply at an earlier date. "Sometimes, you have to look at the big picture."

Journalists are under constraints as well, including space limitations, deadlines, and pressures to not only get the story first, but to convince their editors why it belongs on the front page or at the top of the TV news hour. "If reporters miss a crucial story, they will be accused of being asleep at the wheel," Garrett says.

In an effort the make science news more marketable, television, as well as the print media, relies on elements of drama, conflict, and visually alluring pictures, which according to media watchers can lead to distorted perceptions in the public. As Silverstein puts it, "sound-byte science is not good science."

The result, Fabian observes, is that people may believe a five-second expert on a TV talk show who says something outrageous, but they won't believe the county professionals who testify for 30 minutes at a hearing. "It's fascinating that Oprah has more credibility than the experts," he says.

Some experts worry that too many cries of alarm may desensitize the public's interest and attention to science issues. Says *Chemical Week's* Begley, "The public does have a weariness with health and environmental reporting. It's so ephemeral. Everything causes cancer—grilled hamburger, hot dogs, peanut butter . . . [it gets blown] out of proportion."

Experts agree that journalists and other science communicators need to put science in the context of other research, instead of, for example, placing too much weight on the most recent study when dozens of earlier studies may really be more important. "That's journalism for you. This is what's new and then it's forgotten," says Jacobson.

Despite the challenges reporters face on a daily basis, they get high marks on the whole from most scientists, researchers, fellow journalists, communications experts, and policy makers. Jacobson says, "in general, the media, journalists, do a good job. You can quibble with how much importance is given a story or who is interviewed, but gradually priorities are conveyed."

Government Gab

Federal science agencies and academic institutions are encountering many of the same problems that reporters battle, as pressure mounts for information to be made immediately available to citizens, health providers, health educators, and decision-makers. "We certainly see that at NIH," Thomas says. "The agency is playing a more direct role in communicating and educating people about health ideas." Says Kenneth Olden, director of the NIEHS, "unless information from our laboratories and our scientists is accessible to a wider public, NIEHS cannot fulfill its mission."

NIH launched one of the first and most successful federal hotlines in the early 1980s called 1-800-4-CANCER. Thomas says, "For the public, it is a major challenge to try to figure out what is credible and what isn't." But Thomas cautions that just because a patient is given a statistic over a hotline, it doesn't mean it is relevant to their case.

Finis Cavender, director of EnviroHealth, the toll-free (1-800-NIEHS94) environmental health information clearinghouse established by the NIEHS last October, says that, the NIEHS has to avoid placing value judgments on the information it conveys, even when that information may be disturbing. Cavender says, "We hand out information we'd just prefer not to give out. We try to steer people in a way that will actually be beneficial to them."

Cavender adds that it is important to have a place where people can call back and get some explanation if they need it. "If all you do is send the fact sheet, there is some problem with that." Sometimes the public needs things translated into practical terms, Cavender explains. They often don't understand the concept of relative dosing, for example.

Communicating information to the public is the most difficult when the scientific evidence is inconclusive. Cavender says the NIEHS tries to provide a balanced view, but also tries to encourage the public to be cautious about believing scientific claims, such as those that promise a cure for incurable diseases. "There are people willing to take their money out there," he says.

Popular Perception

One unchangeable obstacle that scientists and journalists encounter is the fact that an individual's frame of reference will always affect the way the message is perceived. "Their perception is always going to have emotional and cultural components that have nothing to do with probability," Garrett says.

Fabian adds that "dealing with the public is never easy. Once the public is aroused, you're dealing with people who are frightened, people who are angry." In part, this is because Americans have a modest level of scientific literacy. Yet the medium of transmission is also to blame. Silverstein explains, "the public is given a sensational headline, but insufficient information to evaluate it, especially with TV."

The bottom line, Begley says, is that "the public has a responsibility to decide whether they believe everything the media tells them. People have to be smart media consumers."

How the current state of science communication is impacting the American public at large is still in question, mainly because it's difficult to assess. Some insist that the media continues to be too alarmist in its reports with doomsaying accounts on everything from global climate change to skin cancer. Others think science journalism wouldn't be so popular if the public thought it was being continually hoodwinked.

Newsday's Garrett says that doomsaying stories are for the most part "ancient news." The trend in the public has gone completely in the other direction toward a free market in terms of the environment, she says.

Yet Begley maintains that overall many journalists still aren't getting it right on the environment. "They're goofing by not telling the real story. Neither the original scare stories nor the backlash were based on a good understanding of the science." After a while, Begley says, the public becomes inured and stops trusting environmental, science, and health reporting. How information is communicated partially determines whether the public becomes jaded, Fabian adds.

Either way, all sides seem to agree that credibility is the best check on science communication. At NIH, Thomas says, "we put credibility upper-most. We realize the only thing we have to offer is credibility. If we put out bad information, any message on top of that will be dead on arrival."

CSIPI's Jacobson says the same is true of special interest groups. "If they lose credibility, they might as well close up shop." Silverstein adds that credibility is paramount for scientists, too.

The responsibility for accurately and effectively communicating science information is not on the media alone. The public, scientists, policy makers, industry, academic institutions, and federal officials are all key players in the effort to improve science communication with the goal of changing the adage to: "You *can* believe everything you read."

Julie Wakefield-Albers

Julie Wakefield-Albers is a freelance journalist in Arlington, Virginia.